

REMARKS

Claims 1-24, 31-36, 37-43, 44-49, 51-56 and 58 are canceled without prejudice or disclaimer. Claims 25 and 30 are amended. Claims 25-30, 36, 50, and 57 are pending.

The specification has been amended to change two embedded hyperlinks to non-HTML language.

It is respectfully submitted that the present amendment presents no new issues or new matter and places this case in condition for allowance. Reconsideration of the application in view of the above amendments and the following remarks is requested.

I. The Specification

The specification has been amended to change two embedded hyperlinks to non-HTML language.

II. Duplicate Claims Warning

The Examiner indicates that if claims 31, 38, 45 and 52 are found allowable, claims 32, 39, 46 and 53 will be objected to as being a substantial duplicate thereof. Applicants' amendment renders this potential issue moot.

III. The Rejection of Claims 25 and 26-58 under 35 U.S.C. 112

Claims 25 and 26-58 are rejected under 35 U.S.C. 112 as indefinite. The Examiner indicates that the recitation for the alterations R118K, R320K or R458K is unclear because many of the recited sequences do not have an arginine at these positions.

As amended, the claims clarify that the invention is directed to variants of alpha-amylase amino acid sequences which have at least 80% homology to SEQ ID NO:12 and which been altered by substituting a lysine at positions 118, 320 and 458

For the foregoing reasons, Applicants submit that the claims overcome this rejection under 35 U.S.C. 112. Applicants respectfully request reconsideration and withdrawal of the rejection.

IV. The Rejection of Claim 30 under 35 U.S.C. 112

Claim 30 is rejected under 35 U.S.C. 112, on the basis that it appears to employ a novel microorganism, which is required to enable the claimed invention, and Applicants must comply with 37 C.F.R. 1.801-809. Applicants submit herewith a statement satisfying the criteria of 37 C.F.R. 1.801-1.809.

For the foregoing reasons, Applicants submit that the claims overcome this rejection under 35 U.S.C. 112. Applicants respectfully request reconsideration and withdrawal of the rejection.

V. The Rejection of Claims 25-58 under 35 U.S.C. 112

Claims 25-58 are rejected under 35 U.S.C. 112, as lacking enablement. The Examiner indicates that the claims lack enablement for variant alpha-amylases having at least 80%, 90%, 95% or 97% homology to SEQ ID NO: 2, 4, 6, 8, 10, 12 or 13. This rejection is respectfully traversed.

The rejection appears to be concerned with whether an artisan would be able to practice the invention to other species than the alpha-amylase shown in SEQ ID NO: 2, 4, 6, 8, 10, 12 or 13. As amended, the claims are directed to variants having a high degree of homology to SEQ ID NO:12. The specification describes many alpha-amylases falling within the claimed invention that an artisan can use to practice the claimed invention. See the specification at page 12, line 28 to page 19, line 9. These alpha-amylases include the alpha-amylase shown in SEQ ID NO:12 having one or more of the following alterations: Delta G184; Delta (R181-G182); Delta (D183-G184); R28N,K; S94K; R118K; N125A,R,K; N174D; R181Q,E,K; G186R; W189R,K; N195F; M202L; Y298H,F; N299A; K302R, S303Q, N306G,D,R,K; R310A,K,Q,E,H,D,N; N314D; R320K; H324K; E345R,D,K,N; Y396F; R400T,K; W439R; R444K; N445K,Q; K446N; Q449E; R458K; N471E; N484Q.

The specification also provides working examples of numerous alpha-amylases which are at least 80% homologous to SEQ ID NO:12. For examples, as described in the Example 8, the following variants of SEQ ID NO:12 were constructed and tested:

AA560+N125A
AA560+N125R
AA560+N306R
AA560+Y298H+N299A+K302R+S303Q+N306G
AA560+delta(D183+G184)+R181Q+E345R
AA560+delta(D183+G184)+R181Q+W189R
AA560+delta(D183+G184)+R181Q+S94K+W189R
AA560+delta(D183+G184)+N195F+R118K+R320K+R458K
AA560+delta(D183+G184)+N195F+W189K+N306K+N445K
AA560+delta(D183+G184)+N195F+R118K+N125K+R444K+N445K
AA560+delta(D183+G184)+N195F+W189K+N445K

AA560+delta(D183+G184)+N195F+R400T
AA560+delta(D183+G184)+N195F+W439R
AA560+delta(D183+G184)+N195F+Q449E
AA560+delta(D183+G184)+N195F+N484Q
AA560+delta(D183+G184)+N195F+R181Q+N445Q+K446N+N484E
AA560+delta(D183+G184)+N195F+R181E+N445Q+K446N
AA560+delta(D183+G184)+N195F+R181E+K446N
AA560+delta(D183+G184)+N195F+R310A+R181Q+ N445Q+K446N
AA560+delta(D183+G184)+N195F+R320K+R181Q+ N445Q+K446N
AA560+delta(D183+G184)+N195F+Q319K+R320D+R181Q+N445Q+K446N
AA560+delta(D183+G184)+N195F+N306A+R181Q+ N445Q+K446N
AA560+delta(D183+G184)+N195F+K302N+R181Q+ N445Q+K446N
AA560+delta(D183+G184)+N195F+E345N+R181Q+ N445Q+K446N
AA560+delta(D183+G184)+N195F+Y298F+R181Q+ N445Q+K446N
AA560+delta(D183+G184)+N195F+R28N+R181Q+ N445Q+K446N
AA560+delta(D183+G184)+N195F+R28N+R310A+ R181Q+N445Q+K446N
AA560+delta(D183+G184)+N195F+N128D+N306D+R181Q+N445Q+K446N

The specification also describes methods which are well-known in the art for practicing the invention, including the processes of producing alpha-amylases related to SEQ ID NO:12 by localized, random doped mutagenesis. See Example 5.

The specification further discloses how to prepare an accurate three dimensional structure of the alpha-amylase of SEQ ID NO:12 and related structures by model building using the crystal structure of the alpha-amylase SP722, as defined by the atomic co-ordinants in Appendix 1. Such structure will provide a very useful tool for an artisan to determine which amino acids can be altered and which amino acids should be conserved.

Thus, as illustrated above, the specification does enable an artisan to practice the claimed invention commensurate in scope with the claims.

For the foregoing reasons, Applicants submit that the claims overcome this rejection under 35 U.S.C. 112. Applicants respectfully request reconsideration and withdrawal of the rejection.

VI. The Rejection of Claims 25, 27, 30, 31, 32, 36-39 and 45-46 under 35 U.S.C. 102

Claims 25, 27, 30, 31, 32, 36-39 and 45-46 are rejected under 35 U.S.C. 102 as being anticipated by Igarashi et al. The Examiner states that Igarashi et al. discloses an alpha-amylase having at least 80%, 90% or 95% homology to SEQ ID NO:2, 12, 13 and having a K at a position corresponding to 320 in SEQ ID NO:2, 12 and 13.

Igarashi et al. does not disclose a substitution of a lysine residue at position 320. Rather, Igarashi discloses an alpha-amylase which is not altered at position 320.


For the foregoing reasons, Applicants submit that the claims overcome this rejection under 35 U.S.C. 102. Applicants respectfully request reconsideration and withdrawal of the rejection.

VII. Conclusion

In view of the above, it is respectfully submitted that all claims are in condition for allowance. Early action to that end is respectfully requested. The Examiner is hereby invited to contact the undersigned by telephone if there are any questions concerning this amendment or application.

Respectfully submitted,

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